I. AMENDMENTS TO THE CLAIMS:

Please cancel claims 26, 27 and 134-139, and add claims 141-148 as follows.

The following listing of claims replaces all prior listings or versions of claims in the present application.

LISTING OF CLAIMS:

1. (Previous Presented) A casted copper alloy,

consisting essentially of Cu: 69 to 88 mass%, Si: 2 to 5 mass%, Zr: 0.0005 to 0.04 mass%, P: 0.01 to 0.25 mass%, and Zn: the balance;

having relation of, in terms of a content of an element a, [a] mass%, f0 = [Cu] - 3.5[Si] - 3[P] = 61 to 71, f1 = [P]/[Zr] = 0.7 to 200, f2 = [Si]/[Zr]=75 to 5000, and f3 = [Si]/[P] = 12 to 240;

wherein the copper alloy has a metal structure that contains α phase and one or more additional phases selected from the group consisting of (i) K phase, (ii) γ phase, (iii) K phase and γ phase, (iv) β phase, and (v) μ phase, and having relation of, in terms of a content of a phase b, [b]%, in an area rate, $f4 = [\alpha] + [\gamma] + [K] \geq 85$ and $f5 = [\gamma] + [K] + 0.3[\mu] - [\beta] = 5$ to 95; and

the copper alloy has an average grain diameter of 200 μm or less in a macrostructure after the copper alloy has been melted and solidified by casting.

2. (Previous Presented) The copper alloy as claimed in claim 1,

additionally containing at least one component selected from Pb: 0.005 to 0.45 mass%, Bi: 0.005 to 0.45 mass%, Se: 0.03 to 0.45 mass%, and Te: 0.01 to 0.45 mass%;

having relation of, in terms of the content of the element a, [a] mass%, f0 = [Cu] - 3.5[Si] - 3[P] + 0.5([Pb] + 0.8([Bi] + [Se]) + 0.6[Te]) = 61 to 71, f1 = [P]/[Zr] = 0.7 to 200,

f2 = [Si]/[Zr] = 75 to 5000, f3 = [Si]/[P] = 12 to 240, f6 = [Cu] - 3.5[Si] - 3[P] + 3([Pb] + 0.8([Bi] + [Se]) + 0.6[Te])$^{1/2}$ ≥ 62, and f7 = [Cu] - 3.5[Si] - 3[P] - 3([Pb] + 0.8([Bi] + [Se]) + 0.6[Te])$^{1/2}$ ≤ 68.5, wherein [a] = 0 as to a non-contained element a;

wherein the metal structure contains α phase and one or more additional phases selected from the group consisting of (i) K phase, (ii) γ phase, (iii) K phase and γ phase, (iv) β phase, and (v) μ phase, and having relation of, in terms of the content of the phase b, [b]%, in an area rate, f4 = [α] + [γ] + [K] ≥ 85 and f5 = [γ] + [K] + 0.3[μ] - [β] = 5 to 95, wherein [b] = 0 as to a non-contained phase b; and

the copper alloy has an average grain diameter of 200 μm or less in the macrostructure after the copper alloy has been melted and solidified by casting.

3. (Previous Presented) The copper alloy as claimed in claim 1,

additionally containing at least one component selected from Sn: 0.05 to 1.5 mass%, As: 0.02 to 0.25 mass% and Sb: 0.02 to 0.25 mass%;

having relation of, in terms of the content of the element a, [a] mass%, f0 = [Cu] - 3.5[Si] - 3[P] - 0.5([Sn] + [As] + [Sb]) = 61 to 71, f1 = [P]/[Zr] = 0.7 to 200, f2 = [Si]/[Zr] = 75 to 5000, and f3 = [Si]/[P] = 12 to 240, wherein [a] = 0 as to a non-contained element a;

wherein the metal structure contains α phase and one or more additional phases selected from the group consisting of (i) K phase, (ii) γ phase, (iii) K phase and γ phase, (iv) β phase, and (v) μ phase, and having relation of, in terms of the content of the phase b, [b]%, in an area rate, f4 = [α] + [γ] + [K] ≥ 85 and f5 = [γ] + [K] + 0.3[μ] - [β]=5 to 95, wherein [b]=0 as to a non-contained phase b; and

the copper alloy has an average grain diameter of 200 μm or less in the macrostructure after the copper alloy has been melted and solidified by casting.

4. (Previous Presented) The copper alloy as claimed in claim 2,

additionally containing at least one component selected from Sn: 0.05 to 1.5 mass%, As: 0.02 to 0.25 mass% and Sb: 0.02 to 0.25 mass%;

having relation of, in terms of the content of the element a, [a] mass%, f0 = [Cu] - 3.5[Si] - 3[P] + 0.5([Pb] + 0.8([Bi] + [Se]) + 0.6[Te]) - 0.5([Sn] + [As] + [Sb]) = 61 to 71, f1 = [P]/[Zr] = 0.7 to 200, f2 = [Si]/[Zr] = 75 to 5000, f3 = [Si]/[P] = 12 to 240, f6 = [Cu] - 3.5[Si] - 3[P] + 3([Pb] + 0.8([Bi] + [Se]) + 0.6[Te])$^{1/2}$ $\geq$ 62, and f7 = [Cu] - 3.5[Si] - 3[P] - 3([Pb] + 0.8([Bi] + [Se]) + 0.6[Te])$^{1/2}$ $\leq$ 68.5, wherein [a] = 0 as to the non-contained element a;

wherein the metal structure contains α phase and one or more additional phases selected from the group consisting of (i) K phase, (ii) γ phase, (iii) K phase and γ phase, (iv) β phase, and (v) μ phase, and having relation of, in terms of the content of the phase b, [b]%, in an area rate, f4 = [α] + [γ] + [K] $\geq$ 85 and f5 = [γ] + [K] + 0.3[μ] - [β] = 5 to 95, wherein [b] = 0 as to the non-contained phase b; and

the copper alloy has an average grain diameter of 200 μm or less in the macrostructure after the copper alloy has been melted and solidified by casting.

5. (Previous Presented) The copper alloy as claimed in claim 1,

additionally containing at least one component selected from Al : 0.02 to 1.5 mass%, Mn : 0.2 to 4 mass%, and Mg : 0.001 to 0.2 mass%;

having relation of, in terms of the content of the element a, [a] mass%, f0 = [Cu] - 3.5[Si] - 3[P] + 0.5([Pb] + 0.8([Bi] + [Se]) + 0.6[Te]) - 0.5([Sn] + [As] + [Sb]) - 1.8[Al] + 2[Mn] + [Mg] = 61 to 71, f1 = [P]/[Zr] = 0.7 to 200, f2 = [Si]/[Zr] = 75 to 5000, and f3 = [Si]/[P] = 12 to 240, wherein [a] = 0 as to the non-contained element a;

wherein the metal structure contains α phase and one or more additional phases selected from the group consisting of (i) K phase, (ii) γ phase, (iii) K phase and γ phase, (iv) β phase, and (v) μ phase, and having relation of, in terms of the content of the phase b, [b]%, in an area rate, $f4 = [\alpha] + [\gamma] + [K] \geq 85$ and $f5 = [\gamma] + [K] + 0.3[\mu] - [\beta] = 5$ to 95, wherein [b] = 0 as to the non-contained phase b; and

the copper alloy has an average grain diameter of 200 μm or less in the macrostructure after the copper alloy has been melted and solidified by casting.

6. (Previously Presented) The copper alloy as claimed in claim 2,

having relation of, between the content of the element a, [a] mass%, and the content of the phase b, [b]%, in an area rate, $f8 = [\gamma] + [K] + 0.3[\mu] - [\beta] + 25([Pb] + 0.8([Bi] + [Se]) + 0.6[Te])^{1/2} \geq 10$, and $f9 = [\gamma] + [K] + 0.3[\mu] - [\beta] - 25([Pb] + 0.8([Bi] + [Se]) + 0.6[Te])^{1/2} \leq 70$, wherein [a] = [b] = 0 as to the non-contained element a and phase b.

7. (Previously Presented) The copper alloy as claimed in claim 1,

wherein, when any one of Fe and Ni is contained as an inevitable impurity, a content of any one of Fe and Ni is less than 0.3 mass%; and when Fe and Ni are contained as an inevitable impurity, a total content of Fe and Ni is less than 0.35 mass%.

8. (Previous Presented) The copper alloy as claimed in claim 1,

wherein, when melted and solidified during casting, a primary crystal is the α phase.

9. (Cancelled)

10. (Previously Presented) The copper alloy as claimed in claim 1,

wherein, when melted and solidified, the copper alloy comprises a dendrite network having a divided crystalline structure, and further comprises a two-dimensional grain shape selected from the group consisting of a circular shape, a non-circular shape near to the circular shape, an elliptical shape, a criss-cross shape, an acicular shape and a polygonal shape.

11. (Previously Presented) The copper alloy as claimed in claim 1,

wherein, the α phase of a matrix is finely divided, and at least one of the K and γ phases are uniformly distributed in the matrix.

12. (Previously Presented) The copper alloy as claimed in claim 2,

wherein, when any one of Pb and Bi is contained, any one of Pb and Bi particles having a fine uniform size is uniformly distributed in a matrix.

13. (Previously Presented) The copper alloy as claimed in claim 1, having any one of a casting obtained in a casting process and a plastic worked material additionally performing plastic working on the casting at least once.

14. (Previously Presented) The copper alloy as claimed in claim 13,

wherein, when the plastic worked material is cut by a lathe using a bite of a rake angle of -6° and a nose radius of 0.4 mm under a condition of a cutting speed of 80 to 160 m/min, a cutting depth of 1.5 mm and a feed speed of 0.11 mm/rev, a generated cut chip is a cut worked material taking a small segment shape of a trapezoidal or triangular shape, and a tape or acicular shape having a length of 25 mm or less.

15. (Original) The copper alloy as claimed in claim 13,

wherein, the casting is a wire, a rod, or a hollow bar cast by horizontal continuous casting, upward casting or up-casting.

16. (Original) The copper alloy as claimed in claim 13,

wherein, the plastic worked material is a hot extruded material, a hot forged material or a hot rolled material.

17. (Previously Presented) The copper alloy as claimed in claim 13, wherein, the plastic worked material is a wire, a rod, or a hollow bar formed by stretching or cold drawing the casting, wherein the casting is a wire, a rod, or a hollow bar cast by horizontal continuous casting, upward casting or up-casting.

18. (Previously Presented) The copper alloy as claimed in claim 13,

wherein, the casting is a casting, a semi-melted casting, a semi-melted formed material, a molten metal forged material or a die cast formed material where at least a dendrite network has a divided crystalline structure in a semi-melted state of a solid phase fraction of 30 to 80% and the two dimensional grain shape of the solid phase has any one of a circular shape, a non-circular shape near to the circular shape, an elliptical shape, a criss-cross shape, an acicular shape and a polygonal shape.

19. (Previously Presented) The copper alloy as claimed in claim 18,

wherein, in the solid phase fraction of 60%, an average grain diameter of the solid phase is less than 150 μm, or an average maximum length of the corresponding solid phase is

less than 200 μm, or the average grain diameter of the solid phase is less than 150 μm and an average maximum length of the corresponding solid phase is less than 200 μm.

20. (Previously Presented) The copper alloy as claimed in claim 18,

wherein, the copper alloy is cast to a near net shape.

21. (Previous Presented) The copper alloy as claimed in claim 13,

wherein, the copper alloy is a water-contact fitting used in contact with water at all times or temporarily.

22. (Previously Presented) The copper alloy as claimed in claim 21,

wherein the copper alloy forms a nipple, a hose nipple, a socket, an elbow, a cheese, a plug, a bushing, a union, a joint, a flange, a stop valve, a strainer, a slith valve, a gate valve, a check valve, a glove value, a diaphragm valve, a pinch valve, a ball valve, a needle valve, a miniature valve, a relief valve, a plug cock, a handle cock, a gland cock, a two-way cock, a three-way cock, a four-way cock, a gas cock, a ball valve, a safety valve, a relief valve, a pressure reducing valve, an electromagnetic valve, a steam trap, a tap water meter, a flowmeter, a hydrant, a water sprinkling faucet, a water stop faucet, a swing cock, a mixed faucet, a corporation faucet, a spout, a branch faucet, a check valve, a branch valve, a flash valve, a switch cock, a shower, a shower hook, a plug, a zarubo, a watering nozzle, a sprinkler, a heating pipe for a water heater, a heating pipe for a heat exchanger, a heating pipe for a boiler, a trap, a fireplug valve, a water supply port, an impeller, an impeller shaft or a pump case.

23. (Previous Presented) The copper alloy as claimed in claim 13,

wherein, the copper alloy forms a frictional engagement member performing relative movement in contact with water at all times or temporarily.

24. (Previously Presented) The copper alloy as claimed in claim 23,

wherein, the copper alloy forms a gear, a sliding bush, a cylinder, a piston shoe, a bearing, a bearing part, a bearing member, a shaft, a roller, a rotary joint part, a bolt, a nut, or a screw shaft.

25. (Previously Presented) The copper alloy as claimed in claim 13,

wherein, the copper alloy forms a pressure sensor, a temperature sensor, a connector, a compressor part, a scroll compressor part, a high pressure valve, a valve open-close value for an air conditioner, a carburetor part, a cable fixture, a mobile phone antenna part, or a terminal.

26-27. (Cancelled)

28. (Previous Presented) The copper alloy as claimed in claim 2,

additionally containing at least one component selected from Al : 0.02 to 1.5 mass%, Mn : 0.2 to 4 mass%, and Mg : 0.001 to 0.2 mass%;

having relation of, in terms of the content of the element a, [a] mass%, $f0 = [Cu] - 3.5[Si] - 3[P] + 0.5([Pb] + 0.8([Bi] + [Se]) + 0.6[Te]) - 0.5([Sn] + [As] + [Sb]) - 1.8[Al] + 2[Mn] + [Mg] = 61$ to 71, $f1 = [P]/[Zr] = 0.7$ to 200, $f2 = [Si]/[Zr] = 75$ to 5000, and $f3 = [Si]/[P] = 12$ to 240, wherein [a] = 0 as to the non-contained element a;

wherein the metal structure contains α phase and one or more additional phases selected from the group consisting of (i) K phase, (ii) γ phase, (iii) K phase and γ phase, (iv) β

phase, and (v) μ phase, and having relation of, in terms of the content of the phase b, [b]%, in an area rate, $f4 = [\alpha] + [\gamma] + [K] \geq 85$ and $f5 = [\gamma] + [K] + 0.3[\mu] - [\beta] = 5$ to 95, wherein [b] = 0 as to the non-contained phase b; and

the copper alloy has an average grain diameter of 200 μm or less in the macrostructure after the copper alloy has been melted and solidified by casting.

29. (Previous Presented) The copper alloy as claimed in claim 3,

additionally containing at least one component selected from Al : 0.02 to 1.5 mass%, Mn : 0.2 to 4 mass%, and Mg : 0.001 to 0.2 mass%;

having relation of, in terms of the content of the element a, [a] mass%, $f0 = [Cu] - 3.5[Si] - 3[P] + 0.5([Pb] + 0.8([Bi] + [Se]) + 0.6[Te]) - 0.5([Sn] + [As] + [Sb]) - 1.8[Al] + 2[Mn] + [Mg] = 61$ to 71, $f1 = [P]/[Zr] = 0.7$ to 200, $f2 = [Si]/[Zr] = 75$ to 5000, and $f3 = [Si]/[P] = 12$ to 240, wherein [a] = 0 as to the non-contained element a;

wherein the metal structure contains α phase and one or more additional phases selected from the group consisting of (i) K phase, (ii) γ phase, (iii) K phase and γ phase, (iv) β phase, and (v) μ phase, and having relation of, in terms of the content of the phase b, [b]%, in an area rate, $f4 = [\alpha] + [\gamma] + [K] \geq 85$ and $f5 = [\gamma] + [K] + 0.3[\mu] - [\beta] = 5$ to 95, wherein [b] = 0 as to the non-contained phase b; and

the copper alloy has an average grain diameter of 200 μm or less in the macrostructure after the copper alloy has been melted and solidified by casting.

30. (Previous Presented) The copper alloy as claimed in claim 4,

additionally containing at least one component selected from Al : 0.02 to 1.5 mass%, Mn : 0.2 to 4 mass%, and Mg : 0.001 to 0.2 mass%;

having relation of, in terms of the content of the element a, [a] mass%, f0 = [Cu] - 3.5[Si] - 3[P] + 0.5([Pb] + 0.8([Bi] + [Se]) + 0.6[Te]) - 0.5([Sn] + [As] + [Sb]) - 1.8[Al] + 2[Mn] + [Mg] = 61 to 71, f1 = [P]/[Zr] = 0.7 to 200, f2 = [Si]/[Zr] = 75 to 5000, and f3 = [Si]/[P] = 12 to 240, wherein [a] = 0 as to the non-contained element a;

wherein the metal structure contains α phase and one or more additional phases selected from the group consisting of (i) K phase, (ii) γ phase, (iii) K phase and γ phase, (iv) β phase, and (v) μ phase, and having relation of, in terms of the content of the phase b, [b]%, in an area rate, f4 = $[\alpha] + [\gamma] + [K] \geq 85$ and f5 = $[\gamma] + [K] + 0.3[\mu] - [\beta] = 5$ to 95, wherein [b] = 0 as to the non-contained phase b; and

the copper alloy has an average grain diameter of 200 μm or less in the macrostructure after the copper alloy has been melted and solidified by casting.

31. (Previously Presented) The copper alloy as claimed in claim 4,

having relation of, between the content of the element a, [a] mass%, and the content of the phase b, [b]%, in an area rate, f8 = $[\gamma] + [K] + 0.3[\mu] - [\beta] + 25([Pb] + 0.8([Bi] + [Se]) + 0.6[Te])^{1/2} \geq 10$, and f9 = $[\gamma] + [K] + 0.3[\mu] - [\beta] - 25([Pb] + 0.8([Bi] + [Se]) + 0.6[Te])^{1/2} \leq 70$, wherein [a] = [b] = 0 as to the non-contained element a and phase b.

32. (Previously Presented) The copper alloy as claimed in claim 28,

having relation of, between the content of the element a, [a] mass%, and the content of the phase b, [b]%, in an area rate, f8 = $[\gamma] + [K] + 0.3[\mu] - [\beta] + 25([Pb] + 0.8([Bi] + [Se]) + 0.6[Te])^{1/2} \geq 10$, and f9 = $[\gamma] + [K] + 0.3[\mu] - [\beta] - 25([Pb] + 0.8([Bi] + [Se]) + 0.6[Te])^{1/2} \leq 70$, wherein [a] = [b] = 0 as to the non-contained element a and phase b.

33. (Previously Presented) The copper alloy as claimed in claim 30,

having relation of, between the content of the element a, [a] mass%, and the content of the phase b, [b]%, in an area rate, $f8 = [\gamma] + [K] + 0.3[\mu] - [\beta] + 25([Pb] + 0.8([Bi] + [Se]) + 0.6[Te])^{1/2} \geq 10$, and $f9 = [\gamma] + [K] + 0.3[\mu] - [\beta] - 25([Pb] + 0.8([Bi] + [Se]) + 0.6[Te])^{1/2} \leq 70$, wherein [a] = [b] = 0 as to the non-contained element a and phase b.

34. (Previously Presented) The copper alloy as claimed in claim 2,

wherein, when any one of Fe and Ni is contained as an inevitable impurity, a content of any one of Fe and Ni is less than 0.3 mass%; and when Fe and Ni are contained as an inevitable impurity, a total content of Fe and Ni is less than 0.35 mass%.

35. (Previously Presented) The copper alloy as claimed in claim 3,

wherein, when any one of Fe and Ni is contained as an inevitable impurity, a content of any one of Fe and Ni is less than 0.3 mass%; and when Fe and Ni are contained as an inevitable impurity, a total content of Fe and Ni is less than 0.35 mass%.

36. (Previously Presented) The copper alloy as claimed in claim 4,

wherein, when any one of Fe and Ni is contained as an inevitable impurity, a content of any one of Fe and Ni is less than 0.3 mass%; and when Fe and Ni are contained as an inevitable impurity, a total content of Fe and Ni is less than 0.35 mass%.

37. (Previously Presented) The copper alloy as claimed in claim 5,

wherein, when any one of Fe and Ni is contained as an inevitable impurity, a content of any one of Fe and Ni is less than 0.3 mass%; and when Fe and Ni are contained as an inevitable impurity, a total content of Fe and Ni is less than 0.35 mass%.

38. (Previous Presented) The copper alloy as claimed in claim 3,

wherein, when melted and solidified during casting, a primary crystal is the α phase.

39. (Previous Presented) The copper alloy as claimed in claim 5,

wherein, when melted and solidified during casting, a primary crystal is the α phase.

40. (Previous Presented) The copper alloy as claimed in claim 3,

wherein, when melted and solidified during casting, a peritectic reaction is generated.

41. (Previous Presented) The copper alloy as claimed in claim 5,

wherein, when melted and solidified during casting, a peritectic reaction is generated.

42. (Previous Presented) The copper alloy as claimed in claim 3,

wherein, when melted and solidified, the copper alloy comprises a dendrite network having a divided crystalline structure, and further comprises a two-dimensional grain shape selected from the group consisting of a circular shape, a non-circular shape near to the circular shape, an elliptical shape, a criss-cross shape, an acicular shape and a polygonal shape.

43. (Previously Presented) The copper alloy as claimed in claim 2,

wherein, the α phase of a matrix is finely divided, and at least one of the K and γ phases are uniformly distributed in the matrix.

44. (Previously Presented) The copper alloy as claimed in claim 3,

wherein, the α phase of a matrix is finely divided, and at least one of the K and γ phases are uniformly distributed in the matrix.

45. (Previously Presented) The copper alloy as claimed in claim 5,

wherein, the α phase of a matrix is finely divided, and at least one of the K and γ phases are uniformly distributed in the matrix.

46. (Previously Presented) The copper alloy as claimed in claim 6,

wherein, the α phase of a matrix is finely divided, and at least one of the K and γ phases are uniformly distributed in the matrix.

47. (Previously Presented) The copper alloy as claimed in claim 7,

wherein, the α phase of a matrix is finely divided, and at least one of the K and γ phases are uniformly distributed in the matrix.

48. (Previously Presented) The copper alloy as claimed in claim 4,

wherein, when any one of Pb and Bi is contained, any one of Pb and Bi particles having a fine uniform size is uniformly distributed in a matrix.

49. (Previously Presented) The copper alloy as claimed in claim 2, having any one of a casting obtained in a casting process and a plastic worked material additionally performing plastic working on the casting at least once.

50. (Previously Presented) The copper alloy as claimed in claim 49,

wherein, when the plastic worked material is cut by a lathe using a bite of a rake angle of -6° and a nose radius of 0.4 mm under a condition of a cutting speed of 80 to 160 m/min, a cutting depth of 1.5 mm and a feed speed of 0.11 mm/rev, a generated cut chip is a cut worked material taking a small segment shape of a trapezoidal or triangular shape, and a tape or acicular shape having a length of 25 mm or less.

51. (Previously Presented) The copper alloy as claimed in claim 3, having any one of a casting obtained in a casting process and a plastic worked material additionally performing plastic working on the casting at least once.

52. (Previously Presented) The copper alloy as claimed in claim 51,

wherein, when the plastic worked material is cut by a lathe using a bite of a rake angle of -6° and a nose radius of 0.4 mm under a condition of a cutting speed of 80 to 160 m/min, a cutting depth of 1.5 mm and a feed speed of 0.11 mm/rev, a generated cut chip is a cut worked material taking a small segment shape of a trapezoidal or triangular shape, and a tape or acicular shape having a length of 25 mm or less.

53. (Previously Presented) The copper alloy as claimed in claim 4, having any one of a casting obtained in a casting process and a plastic worked material additionally performing plastic working on the casting at least once.

54. (Previously Presented) The copper alloy as claimed in claim 5, having any one of a casting obtained in a casting process and a plastic worked material additionally performing plastic working on the casting at least once.

55. (Previously Presented) The copper alloy as claimed in claim 6, having any one of a casting obtained in a casting process and a plastic worked material additionally performing plastic working on the casting at least once.

56. (Previously Presented) The copper alloy as claimed in claim 7, having any one of a casting obtained in a casting process and a plastic worked material additionally performing plastic working on the casting at least once.

57. (Previous Presented) The copper alloy as claimed in claim 140, having any one of a casting obtained in a casting process and a plastic worked material additionally performing plastic working on the casting at least once.

58. (Previously Presented) The copper alloy as claimed in claim 28, having any one of a casting obtained in a casting process and a plastic worked material additionally performing plastic working on the casting at least once.

59. (Previously Presented) The copper alloy as claimed in claim 31, having any one of a casting obtained in a casting process and a plastic worked material additionally performing plastic working on the casting at least once.

60. (Previously Presented) The copper alloy as claimed in claim 35, having any one of a casting obtained in a casting process and a plastic worked material additionally performing plastic working on the casting at least once.

61. (Previously Presented) The copper alloy as claimed in claim 53,

wherein, when the plastic worked material is cut by a lathe using a bite of a rake angle of -6° and a nose radius of 0.4 mm under a condition of a cutting speed of 80 to 160 m/min, a cutting depth of 1.5 mm and a feed speed of 0.11 mm/rev, a generated cut chip is a cut worked material taking a small segment shape of a trapezoidal or triangular shape, and a tape or acicular shape having a length of 25 mm or less.

62. (Previously Presented) The copper alloy as claimed in claim 54,

wherein, when the plastic worked material is cut by a lathe using a bite of a rake angle of -6° and a nose radius of 0.4 mm under a condition of a cutting speed of 80 to 160 m/min, a cutting depth of 1.5 mm and a feed speed of 0.11 mm/rev, a generated cut chip is a cut worked material taking a small segment shape of a trapezoidal or triangular shape, and a tape or acicular shape having a length of 25 mm or less.

63. (Previously Presented) The copper alloy as claimed in claim 58,

wherein, when the plastic worked material is cut by a lathe using a bite of a rake angle of -6° and a nose radius of 0.4 mm under a condition of a cutting speed of 80 to 160 m/min, a cutting depth of 1.5 mm and a feed speed of 0.11 mm/rev, a generated cut chip is a cut worked material taking a small segment shape of a trapezoidal or triangular shape, and a tape or acicular shape having a length of 25 mm or less.

64. (Previously Presented) The copper alloy as claimed in claim 49,

wherein, the casting is a wire, a rod, or a hollow bar cast by horizontal continuous casting, upward casting or up-casting.

65. (Previously Presented) The copper alloy as claimed in claim 51,

wherein, the casting is a wire, a rod, or a hollow bar cast by horizontal continuous casting, upward casting or up-casting.

66. (Previously Presented) The copper alloy as claimed in claim 53,

wherein, the casting is a wire, a rod, or a hollow bar cast by horizontal continuous casting, upward casting or up-casting.

67. (Previously Presented) The copper alloy as claimed in claim 54,

wherein, the casting is a wire, a rod, or a hollow bar cast by horizontal continuous casting, upward casting or up-casting.

68. (Previously Presented) The copper alloy as claimed in claim 58,

wherein, the casting is a wire, a rod, or a hollow bar cast by horizontal continuous casting, upward casting or up-casting.

69. (Previously Presented) The copper alloy as claimed in claim 49,

wherein, the plastic worked material is a hot extruded material, a hot forged material or a hot rolled material.

70. (Previously Presented) The copper alloy as claimed in claim 51,

wherein, the plastic worked material is a hot extruded material, a hot forged material or a hot rolled material.

71. (Previously Presented) The copper alloy as claimed in claim 49, wherein, the plastic worked material is a wire, a rod, or a hollow bar formed by stretching or cold drawing

the casting, wherein the casting is a wire, a rod, or a hollow bar cast by horizontal continuous casting, upward casting or up-casting.

72. (Previously Presented) The copper alloy as claimed in claim 51, wherein, the plastic worked material is a wire, a rod, or a hollow bar formed by stretching or cold drawing the casting, wherein the casting is a wire, a rod, or a hollow bar cast by horizontal continuous casting, upward casting or up-casting.

73. (Previously Presented) The copper alloy as claimed in claim 49,

wherein, the casting is a casting, a semi-melted casting, a semi-melted formed material, a molten metal forged material or a die cast formed material where at least a dendrite network has a divided crystalline structure in a semi-melted state of a solid phase fraction of 30 to 80% and the two dimensional grain shape of the solid phase has any one of a circular shape, a non-circular shape near to the circular shape, an elliptical shape, a criss-cross shape, an acicular shape and a polygonal shape.

74. (Previously Presented) The copper alloy as claimed in claim 73,

wherein, in the solid phase fraction of 60%, an average grain diameter of the solid phase is less than 150 μm, or an average maximum length of the corresponding solid phase is less than 200 μm, or the average grain diameter of the solid phase is less than 150 μm and an average maximum length of the corresponding solid phase is less than 200 μm.

75. (Previously Presented) The copper alloy as claimed in claim 73,

wherein, the copper alloy is cast to a near net shape.

76. (Previously Presented) The copper alloy as claimed in claim 51,

wherein, the casting is a casting, a semi-melted casting, a semi-melted formed material, a molten metal forged material or a die cast formed material where at least a dendrite network has a divided crystalline structure in a semi-melted state of a solid phase fraction of 30 to 80% and the two dimensional grain shape of the solid phase has any one of a circular shape, a non-circular shape near to the circular shape, an elliptical shape, a criss-cross shape, an acicular shape and a polygonal shape.

77. (Previously Presented) The copper alloy as claimed in claim 76,

wherein, in the solid phase fraction of 60%, an average grain diameter of the solid phase is less than 150 μm, or an average maximum length of the corresponding solid phase is less than 200 μm, or the average grain diameter of the solid phase is less than 150 μm and an average maximum length of the corresponding solid phase is less than 200 μm.

78. (Previously Presented) The copper alloy as claimed in claim 76,

wherein, the copper alloy is cast to a near net shape.

79. (Previously Presented) The copper alloy as claimed in claim 19,

wherein, the copper alloy is cast to a near net shape.

80. (Previously Presented) The copper alloy as claimed in claim 74,

wherein, the copper alloy is cast to a near net shape.

81. (Previously Presented) The copper alloy as claimed in claim 77,

wherein, the copper alloy is cast to a near net shape.

82. (Previous Presented) The copper alloy as claimed in claim 49,

wherein, the copper alloy is a water-contact fitting used in contact with water at all times or temporarily.

83. (Previously Presented) The copper alloy as claimed in claim 82,

wherein the copper alloy forms a nipple, a hose nipple, a socket, an elbow, a cheese, a plug, a bushing, a union, a joint, a flange, a stop valve, a strainer, a slith valve, a gate valve, a check valve, a glove value, a diaphragm valve, a pinch valve, a ball valve, a needle valve, a miniature valve, a relief valve, a plug cock, a handle cock, a gland cock, a two-way cock, a three-way cock, a four-way cock, a gas cock, a ball valve, a safety valve, a relief valve, a pressure reducing valve, an electromagnetic valve, a steam trap, a tap water meter, a flowmeter, a hydrant, a water sprinkling faucet, a water stop faucet, a swing cock, a mixed faucet, a corporation faucet, a spout, a branch faucet, a check valve, a branch valve, a flash valve, a switch cock, a shower, a shower hook, a plug, a zarubo, a watering nozzle, a sprinkler, a heating pipe for a water heater, a heating pipe for a heat exchanger, a heating pipe for a boiler, a trap, a fireplug valve, a water supply port, an impeller, an impeller shaft or a pump case.

84. (Previous Presented) The copper alloy as claimed in claim 51,

wherein, the copper alloy is a water-contact fitting used in contact with water at all times or temporarily.

85. (Previously Presented) The copper alloy as claimed in claim 84,

wherein the copper alloy forms a nipple, a hose nipple, a socket, an elbow, a cheese, a plug, a bushing, a union, a joint, a flange, a stop valve, a strainer, a slith valve, a gate valve, a check valve, a glove value, a diaphragm valve, a pinch valve, a ball valve, a needle valve, a miniature valve, a relief valve, a plug cock, a handle cock, a gland cock, a two-way cock, a three-way cock, a four-way cock, a gas cock, a ball valve, a safety valve, a relief valve, a pressure reducing valve, an electromagnetic valve, a steam trap, a tap water meter, a flowmeter, a hydrant, a water sprinkling faucet, a water stop faucet, a swing cock, a mixed faucet, a corporation faucet, a spout, a branch faucet, a check valve, a branch valve, a flash valve, a switch cock, a shower, a shower hook, a plug, a zarubo, a watering nozzle, a sprinkler, a heating pipe for a water heater, a heating pipe for a heat exchanger, a heating pipe for a boiler, a trap, a fireplug valve, a water supply port, an impeller, an impeller shaft or a pump case.

86. (Previous Presented) The copper alloy as claimed in claim 15,

wherein, the copper alloy is a water-contact fitting used in contact with water at all times or temporarily.

87. (Previously Presented) The copper alloy as claimed in claim 86,

wherein the copper alloy forms a nipple, a hose nipple, a socket, an elbow, a cheese, a plug, a bushing, a union, a joint, a flange, a stop valve, a strainer, a slith valve, a gate valve, a check valve, a glove value, a diaphragm valve, a pinch valve, a ball valve, a needle valve, a miniature valve, a relief valve, a plug cock, a handle cock, a gland cock, a two-way cock, a three-way cock, a four-way cock, a gas cock, a ball valve, a safety valve, a relief valve, a pressure reducing valve, an electromagnetic valve, a steam trap, a tap water meter, a flowmeter, a hydrant, a water sprinkling faucet, a water stop faucet, a swing cock, a mixed

faucet, a corporation faucet, a spout, a branch faucet, a check valve, a branch valve, a flash valve, a switch cock, a shower, a shower hook, a plug, a zarubo, a watering nozzle, a sprinkler, a heating pipe for a water heater, a heating pipe for a heat exchanger, a heating pipe for a boiler, a trap, a fireplug valve, a water supply port, an impeller, an impeller shaft or a pump case.

88. (Previous Presented) The copper alloy as claimed in claim 64,

wherein, the copper alloy is a water-contact fitting used in contact with water at all times or temporarily.

89. (Previously Presented) The copper alloy as claimed in claim 88,

wherein the copper alloy forms a nipple, a hose nipple, a socket, an elbow, a cheese, a plug, a bushing, a union, a joint, a flange, a stop valve, a strainer, a slith valve, a gate valve, a check valve, a glove value, a diaphragm valve, a pinch valve, a ball valve, a needle valve, a miniature valve, a relief valve, a plug cock, a handle cock, a gland cock, a two-way cock, a three-way cock, a four-way cock, a gas cock, a ball valve, a safety valve, a relief valve, a pressure reducing valve, an electromagnetic valve, a steam trap, a tap water meter, a flowmeter, a hydrant, a water sprinkling faucet, a water stop faucet, a swing cock, a mixed faucet, a corporation faucet, a spout, a branch faucet, a check valve, a branch valve, a flash valve, a switch cock, a shower, a shower hook, a plug, a zarubo, a watering nozzle, a sprinkler, a heating pipe for a water heater, a heating pipe for a heat exchanger, a heating pipe for a boiler, a trap, a fireplug valve, a water supply port, an impeller, an impeller shaft or a pump case.

90. (Previous Presented) The copper alloy as claimed in claim 65,

wherein, the copper alloy is a water-contact fitting used in contact with water at all times or temporarily.

91. (Previously Presented) The copper alloy as claimed in claim 90,

wherein the copper alloy forms a nipple, a hose nipple, a socket, an elbow, a cheese, a plug, a bushing, a union, a joint, a flange, a stop valve, a strainer, a slith valve, a gate valve, a check valve, a glove value, a diaphragm valve, a pinch valve, a ball valve, a needle valve, a miniature valve, a relief valve, a plug cock, a handle cock, a gland cock, a two-way cock, a three-way cock, a four-way cock, a gas cock, a ball valve, a safety valve, a relief valve, a pressure reducing valve, an electromagnetic valve, a steam trap, a tap water meter, a flowmeter, a hydrant, a water sprinkling faucet, a water stop faucet, a swing cock, a mixed faucet, a corporation faucet, a spout, a branch faucet, a check valve, a branch valve, a flash valve, a switch cock, a shower, a shower hook, a plug, a zarubo, a watering nozzle, a sprinkler, a heating pipe for a water heater, a heating pipe for a heat exchanger, a heating pipe for a boiler, a trap, a fireplug valve, a water supply port, an impeller, an impeller shaft or a pump case.

92. (Previous Presented) The copper alloy as claimed in claim 18,

wherein, the copper alloy is a water-contact fitting used in contact with water at all times or temporarily.

93. (Previously Presented) The copper alloy as claimed in claim 92,

wherein the copper alloy forms a nipple, a hose nipple, a socket, an elbow, a cheese, a plug, a bushing, a union, a joint, a flange, a stop valve, a strainer, a slith valve, a gate valve, a check valve, a glove value, a diaphragm valve, a pinch valve, a ball valve, a needle valve, a

miniature valve, a relief valve, a plug cock, a handle cock, a gland cock, a two-way cock, a three-way cock, a four-way cock, a gas cock, a ball valve, a safety valve, a relief valve, a pressure reducing valve, an electromagnetic valve, a steam trap, a tap water meter, a flowmeter, a hydrant, a water sprinkling faucet, a water stop faucet, a swing cock, a mixed faucet, a corporation faucet, a spout, a branch faucet, a check valve, a branch valve, a flash valve, a switch cock, a shower, a shower hook, a plug, a zarubo, a watering nozzle, a sprinkler, a heating pipe for a water heater, a heating pipe for a heat exchanger, a heating pipe for a boiler, a trap, a fireplug valve, a water supply port, an impeller, an impeller shaft or a pump case.

94. (Previous Presented) The copper alloy as claimed in claim 73,

wherein, the copper alloy is a water-contact fitting used in contact with water at all times or temporarily.

95. (Previously Presented) The copper alloy as claimed in claim 94,

wherein the copper alloy forms a nipple, a hose nipple, a socket, an elbow, a cheese, a plug, a bushing, a union, a joint, a flange, a stop valve, a strainer, a slith valve, a gate valve, a check valve, a glove value, a diaphragm valve, a pinch valve, a ball valve, a needle valve, a miniature valve, a relief valve, a plug cock, a handle cock, a gland cock, a two-way cock, a three-way cock, a four-way cock, a gas cock, a ball valve, a safety valve, a relief valve, a pressure reducing valve, an electromagnetic valve, a steam trap, a tap water meter, a flowmeter, a hydrant, a water sprinkling faucet, a water stop faucet, a swing cock, a mixed faucet, a corporation faucet, a spout, a branch faucet, a check valve, a branch valve, a flash valve, a switch cock, a shower, a shower hook, a plug, a zarubo, a watering nozzle, a sprinkler, a heating pipe for a water heater, a heating pipe for a heat exchanger, a heating pipe

for a boiler, a trap, a fireplug valve, a water supply port, an impeller, an impeller shaft or a pump case.

96. (Previous Presented) The copper alloy as claimed in claim 76,

wherein, the copper alloy is a water-contact fitting used in contact with water at all times or temporarily.

97. (Previously Presented) The copper alloy as claimed in claim 96,

wherein the copper alloy forms a nipple, a hose nipple, a socket, an elbow, a cheese, a plug, a bushing, a union, a joint, a flange, a stop valve, a strainer, a slith valve, a gate valve, a check valve, a glove value, a diaphragm valve, a pinch valve, a ball valve, a needle valve, a miniature valve, a relief valve, a plug cock, a handle cock, a gland cock, a two-way cock, a three-way cock, a four-way cock, a gas cock, a ball valve, a safety valve, a relief valve, a pressure reducing valve, an electromagnetic valve, a steam trap, a tap water meter, a flowmeter, a hydrant, a water sprinkling faucet, a water stop faucet, a swing cock, a mixed faucet, a corporation faucet, a spout, a branch faucet, a check valve, a branch valve, a flash valve, a switch cock, a shower, a shower hook, a plug, a zarubo, a watering nozzle, a sprinkler, a heating pipe for a water heater, a heating pipe for a heat exchanger, a heating pipe for a boiler, a trap, a fireplug valve, a water supply port, an impeller, an impeller shaft or a pump case.

98. (Previous Presented) The copper alloy as claimed in claim 20,

wherein, the copper alloy is a water-contact fitting used in contact with water at all times or temporarily.

99. (Previously Presented) The copper alloy as claimed in claim 98,

wherein the copper alloy forms a nipple, a hose nipple, a socket, an elbow, a cheese, a plug, a bushing, a union, a joint, a flange, a stop valve, a strainer, a slith valve, a gate valve, a check valve, a glove value, a diaphragm valve, a pinch valve, a ball valve, a needle valve, a miniature valve, a relief valve, a plug cock, a handle cock, a gland cock, a two-way cock, a three-way cock, a four-way cock, a gas cock, a ball valve, a safety valve, a relief valve, a pressure reducing valve, an electromagnetic valve, a steam trap, a tap water meter, a flowmeter, a hydrant, a water sprinkling faucet, a water stop faucet, a swing cock, a mixed faucet, a corporation faucet, a spout, a branch faucet, a check valve, a branch valve, a flash valve, a switch cock, a shower, a shower hook, a plug, a zarubo, a watering nozzle, a sprinkler, a heating pipe for a water heater, a heating pipe for a heat exchanger, a heating pipe for a boiler, a trap, a fireplug valve, a water supply port, an impeller, an impeller shaft or a pump case.

100. (Previous Presented) The copper alloy as claimed in claim 75,

wherein, the copper alloy is a water-contact fitting used in contact with water at all times or temporarily.

101. (Previously Presented) The copper alloy as claimed in claim 100,

wherein the copper alloy forms a nipple, a hose nipple, a socket, an elbow, a cheese, a plug, a bushing, a union, a joint, a flange, a stop valve, a strainer, a slith valve, a gate valve, a check valve, a glove value, a diaphragm valve, a pinch valve, a ball valve, a needle valve, a miniature valve, a relief valve, a plug cock, a handle cock, a gland cock, a two-way cock, a three-way cock, a four-way cock, a gas cock, a ball valve, a safety valve, a relief valve, a pressure reducing valve, an electromagnetic valve, a steam trap, a tap water meter, a

flowmeter, a hydrant, a water sprinkling faucet, a water stop faucet, a swing cock, a mixed faucet, a corporation faucet, a spout, a branch faucet, a check valve, a branch valve, a flash valve, a switch cock, a shower, a shower hook, a plug, a zarubo, a watering nozzle, a sprinkler, a heating pipe for a water heater, a heating pipe for a heat exchanger, a heating pipe for a boiler, a trap, a fireplug valve, a water supply port, an impeller, an impeller shaft or a pump case.

102. (Previous Presented) The copper alloy as claimed in claim 78,

wherein, the copper alloy is a water-contact fitting used in contact with water at all times or temporarily.

103. (Previously Presented) The copper alloy as claimed in claim 102,

wherein the copper alloy forms a nipple, a hose nipple, a socket, an elbow, a cheese, a plug, a bushing, a union, a joint, a flange, a stop valve, a strainer, a slith valve, a gate valve, a check valve, a glove value, a diaphragm valve, a pinch valve, a ball valve, a needle valve, a miniature valve, a relief valve, a plug cock, a handle cock, a gland cock, a two-way cock, a three-way cock, a four-way cock, a gas cock, a ball valve, a safety valve, a relief valve, a pressure reducing valve, an electromagnetic valve, a steam trap, a tap water meter, a flowmeter, a hydrant, a water sprinkling faucet, a water stop faucet, a swing cock, a mixed faucet, a corporation faucet, a spout, a branch faucet, a check valve, a branch valve, a flash valve, a switch cock, a shower, a shower hook, a plug, a zarubo, a watering nozzle, a sprinkler, a heating pipe for a water heater, a heating pipe for a heat exchanger, a heating pipe for a boiler, a trap, a fireplug valve, a water supply port, an impeller, an impeller shaft or a pump case.

104. (Previous Presented) The copper alloy as claimed in claim 49,

wherein, the copper alloy forms a frictional engagement member performing relative movement in contact with water at all times or temporarily.

105. (Previous Presented) The copper alloy as claimed in claim 51,

wherein, the copper alloy forms a frictional engagement member performing relative movement in contact with water at all times or temporarily.

106. (Previous Presented) The copper alloy as claimed in claim 53,

wherein, the copper alloy forms a frictional engagement member performing relative movement in contact with water at all times or temporarily.

107. (Previous Presented) The copper alloy as claimed in claim 54,

wherein, the copper alloy forms a frictional engagement member performing relative movement in contact with water at all times or temporarily.

108. (Previous Presented) The copper alloy as claimed in claim 58,

wherein, the copper alloy forms a frictional engagement member performing relative movement in contact with water at all times or temporarily.

109. (Previous Presented) The copper alloy as claimed in claim 15,

wherein, the copper alloy forms a frictional engagement member performing relative movement in contact with water at all times or temporarily.

110. (Previous Presented) The copper alloy as claimed in claim 64,

wherein, the copper alloy forms a frictional engagement member performing relative movement in contact with water at all times or temporarily.

111. (Previous Presented) The copper alloy as claimed in claim 65,

wherein, the copper alloy forms a frictional engagement member performing relative movement in contact with water at all times or temporarily.

112. (Previous Presented) The copper alloy as claimed in claim 18,

wherein, the copper alloy forms a frictional engagement member performing relative movement in contact with water at all times or temporarily.

113. (Previous Presented) The copper alloy as claimed in claim 73,

wherein, the copper alloy forms a frictional engagement member performing relative movement in contact with water at all times or temporarily.

114. (Previous Presented) The copper alloy as claimed in claim 76,

wherein, the copper alloy forms a frictional engagement member performing relative movement in contact with water at all times or temporarily.

115. (Previous Presented) The copper alloy as claimed in claim 20,

wherein, the copper alloy forms a frictional engagement member performing relative movement in contact with water at all times or temporarily.

116. (Previous Presented) The copper alloy as claimed in claim 75,

wherein, the copper alloy forms a frictional engagement member performing relative movement in contact with water at all times or temporarily.

117. (Previous Presented) The copper alloy as claimed in claim 78,

wherein, the copper alloy forms a frictional engagement member performing relative movement in contact with water at all times or temporarily.

118. (Previously Presented) The copper alloy as claimed in claim 104,

wherein, the copper alloy forms a gear, a sliding bush, a cylinder, a piston shoe, a bearing, a bearing part, a bearing member, a shaft, a roller, a rotary joint part, a bolt, a nut, or a screw shaft.

119. (Previously Presented) The copper alloy as claimed in claim 105,

wherein, the copper alloy forms a gear, a sliding bush, a cylinder, a piston shoe, a bearing, a bearing part, a bearing member, a shaft, a roller, a rotary joint part, a bolt, a nut, or a screw shaft.

120. (Previously Presented) The copper alloy as claimed in claim 106,

wherein, the copper alloy forms a gear, a sliding bush, a cylinder, a piston shoe, a bearing, a bearing part, a bearing member, a shaft, a roller, a rotary joint part, a bolt, a nut, or a screw shaft.

121. (Previously Presented) The copper alloy as claimed in claim 107,

wherein, the copper alloy forms a gear, a sliding bush, a cylinder, a piston shoe, a bearing, a bearing part, a bearing member, a shaft, a roller, a rotary joint part, a bolt, a nut, or a screw shaft.

122. (Previously Presented) The copper alloy as claimed in claim 108,

wherein, the copper alloy forms a gear, a sliding bush, a cylinder, a piston shoe, a bearing, a bearing part, a bearing member, a shaft, a roller, a rotary joint part, a bolt, a nut, or a screw shaft.

123. (Previously Presented) The copper alloy as claimed in claim 49,

wherein, the copper alloy forms a pressure sensor, a temperature sensor, a connector, a compressor part, a scroll compressor part, a high pressure valve, a valve open-close value for an air conditioner, a carburetor part, a cable fixture, a mobile phone antenna part, or a terminal.

124. (Previously Presented) The copper alloy as claimed in claim 51,

wherein, the copper alloy forms a pressure sensor, a temperature sensor, a connector, a compressor part, a scroll compressor part, a high pressure valve, a valve open-close value for an air conditioner, a carburetor part, a cable fixture, a mobile phone antenna part, or a terminal.

125. (Previously Presented) The copper alloy as claimed in claim 53,

wherein, the copper alloy forms a pressure sensor, a temperature sensor, a connector, a compressor part, a scroll compressor part, a high pressure valve, a valve open-close value

for an air conditioner, a carburetor part, a cable fixture, a mobile phone antenna part, or a terminal.

126. (Previously Presented) The copper alloy as claimed in claim 54,

wherein, the copper alloy forms a pressure sensor, a temperature sensor, a connector, a compressor part, a scroll compressor part, a high pressure valve, a valve open-close value for an air conditioner, a carburetor part, a cable fixture, a mobile phone antenna part, or a terminal.

127. (Previously Presented) The copper alloy as claimed in claim 58,

wherein, the copper alloy forms a pressure sensor, a temperature sensor, a connector, a compressor part, a scroll compressor part, a high pressure valve, a valve open-close value for an air conditioner, a carburetor part, a cable fixture, a mobile phone antenna part, or a terminal.

128. (Previously Presented) The copper alloy as claimed in claim 18,

wherein, the copper alloy forms a pressure sensor, a temperature sensor, a connector, a compressor part, a scroll compressor part, a high pressure valve, a valve open-close value for an air conditioner, a carburetor part, a cable fixture, a mobile phone antenna part, or a terminal.

129. (Previously Presented) The copper alloy as claimed in claim 73,

wherein, the copper alloy forms a pressure sensor, a temperature sensor, a connector, a compressor part, a scroll compressor part, a high pressure valve, a valve open-close value

for an air conditioner, a carburetor part, a cable fixture, a mobile phone antenna part, or a terminal.

130. (Previously Presented) The copper alloy as claimed in claim 76,

wherein, the copper alloy forms a pressure sensor, a temperature sensor, a connector, a compressor part, a scroll compressor part, a high pressure valve, a valve open-close value for an air conditioner, a carburetor part, a cable fixture, a mobile phone antenna part, or a terminal.

131. (Previously Presented) The copper alloy as claimed in claim 79,

wherein, the copper alloy forms a pressure sensor, a temperature sensor, a connector, a compressor part, a scroll compressor part, a high pressure valve, a valve open-close value for an air conditioner, a carburetor part, a cable fixture, a mobile phone antenna part, or a terminal.

132. (Previously Presented) The copper alloy as claimed in claim 80,

wherein, the copper alloy forms a pressure sensor, a temperature sensor, a connector, a compressor part, a scroll compressor part, a high pressure valve, a valve open-close value for an air conditioner, a carburetor part, a cable fixture, a mobile phone antenna part, or a terminal.

133. (Previously Presented) The copper alloy as claimed in claim 81,

wherein, the copper alloy forms a pressure sensor, a temperature sensor, a connector, a compressor part, a scroll compressor part, a high pressure valve, a valve open-close value

for an air conditioner, a carburetor part, a cable fixture, a mobile phone antenna part, or a terminal.

134-139. (Cancelled)

140. (Previously Presented) A casted copper alloy,

consisting essentially of Cu: 69 to 88 mass%, Si: 2 to 5 mass%, Zr: 0.0005 to 0.04 mass%, P: 0.01 to 0.25 mass%, and Zn: the balance;

having relation of, in terms of a content of an element a, [a] mass%, f0 = [Cu] - 3.5[Si] - 3[P] = 61 to 71, f1 = [P]/[Zr] = 0.7 to 200, f2 = [Si]/[Zr]=75 to 5000, and f3 = [Si]/[P] = 12 to 240;

wherein the copper alloy has a metal structure that contains α phase and one or more additional phases selected from the group consisting of (i) K phase, (ii) γ phase, (iii) K phase and γ phase, (iv) β phase, and (v) μ phase, and having relation of, in terms of a content of a phase b, [b]%, in an area rate, $f4 = [\alpha] + [\gamma] + [K] \geq 85$ and $f5 = [\gamma] + [K] + 0.3[\mu] - [\beta] = 5$ to 95; and

the copper alloy has an average grain diameter of 200 μm or less in a macrostructure after the copper alloy has been melted and solidified by casting, wherein, when melted and solidified during casting, a peritectic reaction is generated.

141. (New) A method of producing a copper alloy comprising the steps of:

(a) casting a copper alloy consisting essentially of Cu: 69 to 88 mass%, Si: 2 to 5 mass%, Zr: 0.0005 to 0.04 mass%, P: 0.01 to 0.25 mass%, and Zn: the balance;

having relation of, in terms of a content of an element a, [a] mass%, f0 = [Cu] - 3.5[Si] - 3[P] = 61 to 71, f1 = [P]/[Zr] = 0.7 to 200, f2 = [Si]/[Zr]=75 to 5000, and f3 = [Si]/[P] = 12 to 240; and

wherein the copper alloy has a metal structure that contains α phase and one or more additional phases selected from the group consisting of (i) K phase, (ii) γ phase, (iii) K phase and γ phase, (iv) β phase, and (v) μ phase, and having relation of, in terms of a content of a phase b, [b]%, in an area rate, $f4 = [\alpha] + [\gamma] + [K] \geq 85$ and $f5 = [\gamma] + [K] + 0.3[\mu] - [\beta] = 5$ to 95,

(b) obtaining an average grain diameter of 200 μm or less in a macrostructure after the copper alloy has been melted and solidified,

wherein, in the casting process, Zr is added in a form of a copper alloy material containing Zr, and Zr is prevented from being added in a form of an oxide, or a sulfide, or an oxide and a sulfide.

142. (New) The method as claimed in claim 141,

wherein, the copper alloy material containing Zr is a copper alloy that additionally contains at least one component selected from P, Mg, Al, Sn, Mn and B based on a Cu-Zr alloy and a Cu-Zn-Zr alloy.

143. (New) A method of producing a copper alloy comprising the steps of:

(a) casting a copper alloy consisting essentially of Cu: 69 to 88 mass%, Si: 2 to 5 mass%, Zr: 0.0005 to 0.04 mass%, P: 0.01 to 0.25 mass%, and Zn: the balance;

having relation of, in terms of a content of an element a, [a] mass%, f0 = [Cu] - 3.5[Si] - 3[P] = 61 to 71, f1 = [P]/[Zr] = 0.7 to 200, f2 = [Si]/[Zr]=75 to 5000, and f3 = [Si]/[P] = 12 to 240; and

wherein the copper alloy has a metal structure that contains α phase and one or more additional phases selected from the group consisting of (i) K phase, (ii) γ phase, (iii) K phase and γ phase, (iv) β phase, and (v) μ phase, and having relation of, in terms of a content of a phase b, [b]%, in an area rate, $f4 = [\alpha] + [\gamma] + [K] \geq 85$ and $f5 = [\gamma] + [K] + 0.3[\mu] - [\beta] = 5$ to 95,

(b) obtaining an average grain diameter of 200 μm or less in a macrostructure after the copper alloy has been melted and solidified,

wherein the copper alloy additionally contains at least one component selected from Sn: 0.05 to 1.5 mass%, As: 0.02 to 0.25 mass% and Sb: 0.02 to 0.25 mass%;

having relation of, in terms of the content of the element a, [a] mass%, $f0 = [Cu] - 3.5[Si] - 3[P] - 0.5([Sn] + [As] + [Sb]) = 61$ to 71, $f1 = [P]/[Zr] = 0.7$ to 200, $f2 = [Si]/[Zr] = 75$ to 5000, and $f3 = [Si]/[P] = 12$ to 240, wherein [a] = 0 as to a non-contained element a; and

wherein the metal structure contains α phase and one or more additional phases selected from the group consisting of (i) K phase, (ii) γ phase, (iii) K phase and γ phase, (iv) β phase, and (v) μ phase, and having relation of, in terms of the content of the phase b, [b]%, in an area rate, $f4 = [\alpha] + [\gamma] + [K] \geq 85$ and $f5 = [\gamma] + [K] + 0.3[\mu] - [\beta]=5$ to 95, wherein [b]=0 as to a non-contained phase b, and

wherein, in the casting process, Zr is added in a form of a copper alloy material containing Zr, and Zr is prevented from being added in a form of an oxide, or a sulfide, or an oxide and a sulfide.

144. (New) The method as claimed in claim 143,

wherein, the copper alloy material containing Zr is a copper alloy that additionally contains at least one component selected from P, Mg, Al, Sn, Mn and B based on a Cu-Zr alloy and a Cu-Zn-Zr alloy.

145. (New) A method of producing a copper alloy comprising the steps of:

(a) casting a copper alloy consisting essentially of Cu: 69 to 88 mass%, Si: 2 to 5 mass%, Zr: 0.0005 to 0.04 mass%, P: 0.01 to 0.25 mass%, and Zn: the balance;

having relation of, in terms of a content of an element a, [a] mass%, f0 = [Cu] - 3.5[Si] - 3[P] = 61 to 71, f1 = [P]/[Zr] = 0.7 to 200, f2 = [Si]/[Zr]=75 to 5000, and f3 = [Si]/[P] = 12 to 240; and

wherein the copper alloy has a metal structure that contains α phase and one or more additional phases selected from the group consisting of (i) K phase, (ii) γ phase, (iii) K phase and γ phase, (iv) β phase, and (v) μ phase, and having relation of, in terms of a content of a phase b, [b]%, in an area rate, $f4 = [\alpha] + [\gamma] + [K] \geq 85$ and $f5 = [\gamma] + [K] + 0.3[\mu] - [\beta] = 5$ to 95,

(b) obtaining an average grain diameter of 200 μm or less in a macrostructure after the copper alloy has been melted and solidified,

wherein the copper alloy additionally contains at least one component selected from Al : 0.02 to 1.5 mass%, Mn : 0.2 to 4 mass%, and Mg : 0.001 to 0.2 mass%;

having relation of, in terms of the content of the element a, [a] mass%, f0 = [Cu] - 3.5[Si] - 3[P] + 0.5([Pb] + 0.8([Bi] + [Se]) + 0.6[Te]) - 0.5([Sn] + [As] + [Sb]) - 1.8[Al] + 2[Mn] + [Mg] = 61 to 71, f1 = [P]/[Zr] = 0.7 to 200, f2 = [Si]/[Zr] = 75 to 5000, and f3 = [Si]/[P] = 12 to 240, wherein [a] = 0 as to the non-contained element a; and

wherein the metal structure contains α phase and one or more additional phases selected from the group consisting of (i) K phase, (ii) γ phase, (iii) K phase and γ phase, (iv) β

phase, and (v) μ phase, and having relation of, in terms of the content of the phase b, [b]%, in an area rate, $f4 = [\alpha] + [\gamma] + [K] \geq 85$ and $f5 = [\gamma] + [K] + 0.3[\mu] - [\beta] = 5$ to 95, wherein [b] = 0 as to the non-contained phase b, and

wherein, in the casting process, Zr is added in a form of a copper alloy material containing Zr, and Zr is prevented from being added in a form of an oxide, or a sulfide, or an oxide and a sulfide.

146. (New) The method as claimed in claim 145,

wherein, the copper alloy material containing Zr is a copper alloy that additionally contains at least one component selected from P, Mg, Al, Sn, Mn and B based on a Cu-Zr alloy and a Cu-Zn-Zr alloy.

147. (New) A method of producing a copper alloy comprising the steps of:

(a) casting a copper alloy consisting essentially of Cu: 69 to 88 mass%, Si: 2 to 5 mass%, Zr: 0.0005 to 0.04 mass%, P: 0.01 to 0.25 mass%, and Zn: the balance;

having relation of, in terms of a content of an element a, [a] mass%, $f0 = [Cu] - 3.5[Si] - 3[P] = 61$ to 71, $f1 = [P]/[Zr] = 0.7$ to 200, $f2 = [Si]/[Zr]=75$ to 5000, and $f3 = [Si]/[P] = 12$ to 240; and

wherein the copper alloy has a metal structure that contains α phase and one or more additional phases selected from the group consisting of (i) K phase, (ii) γ phase, (iii) K phase and γ phase, (iv) β phase, and (v) μ phase, and having relation of, in terms of a content of a phase b, [b]%, in an area rate, $f4 = [\alpha] + [\gamma] + [K] \geq 85$ and $f5 = [\gamma] + [K] + 0.3[\mu] - [\beta] = 5$ to 95,

(b) obtaining an average grain diameter of 200 μm or less in a macrostructure after the copper alloy has been melted and solidified,

wherein, when any one of Fe and Ni is contained as an inevitable impurity, a content of any one of Fe and Ni is less than 0.3 mass%; and when Fe and Ni are contained as an inevitable impurity, a total content of Fe and Ni is less than 0.35 mass%, and

wherein, in the casting process, Zr is added in a form of a copper alloy material containing Zr, and Zr is prevented from being added in a form of an oxide, or a sulfide, or an oxide and a sulfide.

148. (New) The method as claimed in claim 147,

wherein, the copper alloy material containing Zr is a copper alloy that additionally contains at least one component selected from P, Mg, Al, Sn, Mn and B based on a Cu-Zr alloy and a Cu-Zn-Zr alloy.